



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/406,882	09/28/1999	PETER D. BURNS	78515DMW	2034

1333 7590 07/02/2003

PATENT LEGAL STAFF
EASTMAN KODAK COMPANY
343 STATE STREET
ROCHESTER, NY 14650-2201

EXAMINER

MISLEH, JUSTIN P

ART UNIT	PAPER NUMBER
----------	--------------

2612

DATE MAILED: 07/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/406,882

Applicant(s)

BURNS, PETER D.

Examiner

Justin P Misleh

Art Unit

2612

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 4, 6 - 17, and 19 - 23 is/are rejected.
- 7) ☒ Claim(s) 5 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 October 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: no specific reference to the claimed provisional application. As stated in the MPEP § 201.11 and 35 U.S.C. 119(e) ...

(1) An application for patent filed under section 111(a) or section 363 of this title for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in a provisional application filed under section 111(b) of this title, by an inventor or inventors named in the provisional application, **shall have the same effect, as to such invention, as though filed on the date of the provisional application filed under section 111(b) of this title, if the application for patent filed under section 111(a) or section 363 of this title is filed not later than 12 months after the date on which the provisional application was filed and if it contains or is amended to contain a specific reference to the provisional application.** No application shall be entitled to the benefit of an earlier filed provisional application under this subsection unless an amendment containing the specific reference to the earlier filed provisional application is submitted at such time during the pendency of the application as required by the Director. The Director may consider the failure to submit such an amendment within that time period as a waiver of any benefit under this subsection. The Director may establish procedures, including the payment of a surcharge, to accept an unintentionally delayed submission of an amendment under this subsection during the pendency of the application

(2) A provisional application filed under section 111(b) of this title may not be relied upon in any proceeding in the Patent and Trademark Office unless the fee set forth in subparagraph (A) or (C) of section 41(a)(1) of this title has been paid.

(3) If the day that is 12 months after the filing date of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, the period of pendency of the provisional application shall be extended to the next succeeding secular or business day.

Appropriate correction is required.

2. The disclosure is objected to because of the following informalities: inconsistency between the *Parts List*, specification, and drawings. More specifically, 7, 15, and 39 contain errors.

Appropriate correction is required.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 7 (figure 2), 38 (figure 3). A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 4, 6 – 9, 12 – 15, 17, 19 – 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto et al.

For the following rejections, please refer to figures 1, 3, and 8 and columns 4 (lines 42 – 56), 5 (lines 14 – 68), 6 (lines 1 – 15 and 65 – 68), 7 (lines 1 – 20 and 47 – 68), 8 (lines 1 – 9), 9 (lines 38 – 68), 10 (lines 1 – 61), 11 (lines 21 – 68), 12 (lines 1 – 65), and 16 (lines 7 – 45).

Yamamoto et al. disclose a method in color correction using a digital filter with a phase response that compensates for shifting and an amplitude response for enhancing the sharpness. The Examiner notes that while Yamamoto et al. teach of the same method as the Applicant, the method of Yamamoto et al. is applied differently than that of the Applicant, however, the claims of the Applicant are written broad enough to be clearly read on the method of Yamamoto et al.

Art Unit: 2612

6. For claim 1, as stated in the MPEP § 2111.02 (please see also *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 – CCPA 1951), the preamble of the claim neither recites the limitations of the claim nor is the preamble necessary to give life, meaning, and vitality to the claim, therefore, the preamble is not served to further define the structure of the claim. The Examiner notes that the limitations of claim 1 do not recite *digital images*, rather recite *digital records*.

Yamamoto et al. disclose a method of dot sequential error correction, correcting the color misregistration of the multicolor linear image sensor as shown in figure 3. The linear image sensor (104) is comprised of a linear array of photosensitive elements in which each photosensitive element is responsible for detecting a particular wavelength of light (either Red, Green, Blue or Cyan, Magenta, Yellow). Three photosensitive elements comprised of one set of primary colors/complementary colors (either Red, Green, Blue or Cyan, Magenta, Yellow) correspond to one dot (pixel), as shown in figure 3. Since, Yamamoto et al. teach of a completely digital system including shift registers (201 in figure 1), coefficient registers (202 in figure 1), and multipliers (205 in figure 1), it is inherent that all output from the image sensor (image reader in figure 1) is in digital (please also see figure 8). Therefore, Yamamoto et al. teach color registration correction, which is the correction of the error between color spacing differences in each pixel (approximately 1/3 of each pixel), since each color within the pixel is not in the same position, through the use of a digital filter in which the coefficients for amplitude and phase compensation are predetermined in the exemplary embodiment (figure 1) or through the feature/shift detection of each dot in the present embodiment (figure 8). The image feature detector (4) of figure 8 decides between two separate and different sets of coefficients for the

Art Unit: 2612

compensation process. The first set of coefficients is determined based upon conventional linear interpolation methods, as stated in column 5, lines 14 – 45. The second set of coefficients is determined based upon the features of neighboring pixels and the shift/spacing differences between each color within a pixel, as stated in columns 5 - 10. The image feature detector resembles an edge detector since it decides upon which set of coefficients to use in compensation based upon the features it detects in the present pixel from the neighboring pixels. For example, as stated in column 12 (lines 24 – 52), when the nearest neighboring pixels have large differences in lightness, hence the present pixel is an edge, the second set of coefficients (shift determination relative to the green color record) are used and when the nearest neighboring pixels are close in lightness, the first set of coefficients are used (similar to conventional linear interpolation). The colors within each pixel will herein be referred to as digital records wherein each digital record is wavelength-dependent (either Red, Green, Blue or Cyan, Magenta, Yellow). Therefore, as stated above, there are three wavelength-dependent digital records per pixel.

Yamamoto et al. disclose, a method for improving the wavelength dependent registration of digital images, said method comprising the steps of:

- a. Detecting a similar feature (in image feature detector 4) in two or more digital records (Red, Green, and Blue) of the same original search digital record (one pixel) being wavelength-dependent (The similar feature detected is the edge of the digital records with respect to each other within each pixel and surrounding pixels. Once the similar feature is detected, the image feature detector chooses the second set of coefficients to use for compensation.);

Art Unit: 2612

- b. Determining from the feature a shift due to misregistration of as least one of the digital records relative to another of the digital records (As stated above, the edge feature is detected for the digital records with respect to each other within each pixel and the neighboring pixels. When an edge is present, the second set of coefficients is used, which are determined from the shifts in the digital records. As shown in figure 3, the digital records of a pixel are not in the same position as one another, therefore, their misregistration is a shift due to displacement); and
 - c. Processing (performed in compensation circuit 2) said at least one of the digital records with a digital filter (compensation circuit 2, as shown in detail in figure 1) having a phase response that compensates for the shift, thereby providing a correction for the wavelength-dependent misregistration between the digital records (please see column 11, lines 43 – 46, and column 5, lines 61 – 68, and column 6, lines 1 – 15).
7. For claim 14, also see claim 1 rejection, Yamamoto et al. disclose, a computer program product for improving the color registration of digital images comprising: a computer readable storage medium having a computer program stored thereon for performing the steps of (Although not explicitly taught, it is inherent that a computer readable storage medium having a computer program stored thereon, since Yamamoto et al. teach of an entirely digital system incapable of operation without microprocessor/CPU instruction driven control):
- a. Detecting a similar feature (in image feature detector 4) in two or more digital color records (Red, Green, and Blue) of the same scene (one pixel; The similar feature detected is the edge of the digital records with respect to each other within each pixel and

surrounding pixels. Once the similar feature is detected, the image feature detector chooses the second set of coefficients to use for compensation.);

b. Determining from the feature a shift due to misregistration of as least one of the digital color records relative to another of the digital color records (As stated above, the edge feature is detected for the digital records with respect to each other within each pixel and the neighboring pixels. When an edge is present, the second set of coefficients is used, which are determined from the shifts in the digital records. As shown in figure 3, the digital records of a pixel are not in the same position as one another, therefore, their misregistration is a shift due to displacement); and

c. Processing (performed in compensation circuit 2) said at least one of the digital color records with a digital filter (compensation circuit 2, as shown in detail in figure 1) having a phase response that compensates for the shift, thereby providing a correction for the color misregistration between the digital color records (please see column 11, lines 43 – 46, and column 5, lines 61 – 68, and column 6, lines 1 – 15).

2. As for claims 2 and 15, Yamamoto et al. disclose, wherein step (a) comprises detecting a graphical element in each of the digital records. Yamamoto et al. teach detecting a similar feature (in image feature detector 4) in two or more digital records (Red, Green, and Blue) of the same original search digital record (one pixel) being wavelength-dependent. The similar feature detected is the edge of the digital records with respect to each other within each pixel and surrounding pixels. Once the similar feature is detected, the image feature detector chooses the second set of coefficients to use for compensation. Therefore, since the shift is due to

Art Unit: 2612

displacement of the digital records within a pixel within a linear array of pixels, it is detecting a graphical element (shift relative to another digital record) in each of the digital records.

3. As for claims 4 and 17, Yamamoto et al. disclose, wherein step (a) comprises detecting an edge feature in each of the digital records. The image feature detector resembles an edge detector since it decides upon which set of coefficients to use in compensation based upon the features it detects in the present pixel from the neighboring pixels. For example, as stated in column 12 (lines 24 – 52), when the nearest neighboring pixels have large differences in lightness, hence an edge in the present pixel, the second set of coefficients (shift determination relative to the green color record) are used and when the nearest neighboring pixels are close in lightness, the first set of coefficients are used (similar to conventional linear interpolation).

4. As for claims 6 and 19, Yamamoto et al. disclose, as stated in columns 11 (lines 67 and 68) and 12 (lines 1 – 11) wherein step (b) comprises computing a difference in pixel location of the feature located in said at least one digital record relative to the same feature located in said another of the digital records. The image feature detector detects the edge feature in the present digital record from the lightness in the surrounding digital records. Once an edge is detected in the present digital record, a reference digital record is chosen (Green) and the pixel differences/correction coefficients are calculated.

5. As for claims 7 and 20, Yamamoto et al. disclose, wherein step (c) comprises processing the digital records with a FIR filter having an asymmetric response represented by a set of coefficients (see table 1 in column 6). Although Yamamoto et al. do not explicitly disclose a FIR filter; it is inherent that a FIR filter is used since the digital filter is used for phase

Art Unit: 2612

compensation. IIR filters distort the phase of the signal by not delaying the input signal, therefore rendering the method of Yamamoto et al. in operable.

6. As for claims 8 and 21, Yamamoto et al. disclose, wherein step (c) comprises using a set of precalculated coefficients selected from a plurality of sets precalculated coefficients for various pixel shifts. As stated above, Yamamoto et al. teach color registration correction through the use of a digital filter in which the coefficients for amplitude and phase compensation are predetermined. The image feature detector (4) of figure 8 decides between two separate and different sets of coefficients for the compensation process. The first set of coefficients is determined based upon the shift/spacing differences between each color within a pixel. The second set of coefficients is determined based upon the features of neighboring pixels. The image feature detector decides upon which set of coefficients to use in compensation based upon the features it detects in neighboring pixels.

7. As for claims 9 and 22, Yamamoto et al. disclose, wherein step (c) comprises processing said at least one of the digital records with digital filter having a magnitude response that compensates for and aspect of the digital recorded other than misregistration. It is inherent that the coefficients used for compensation from the digital filter with a magnitude (amplitude) response and a phase response. The phase response inherently shifts the digital records while the magnitude response inherently brightens the digital records. Yamamoto et al. explicitly teach the design of the filter coefficients to compensate for phase and resolution errors (see columns 5, lines 61 – 68, and 6, lines 1 – 15).

8. As for claim 12, Yamamoto et al. disclose, a method as claimed in claim 1 wherein the digital records are red, green, and blue records (see figure 1).

Art Unit: 2612

9. As for claim 13, Yamamoto et al. disclose, as stated in columns 5 (lines 46 – 68) and 6 (lines 1 – 64), a method as claimed in claim 12 wherein said another of the records in step (b) is the green color record and the red and blue color records are filtered in step (c) to correct for color misregistration between the red and blue color records and the green color record. As shown with equation set 2 in column 5 and as stated in column 9 (lines 37 – 61), the similar feature detected is the shift of the digital records with respect to each other, including a green color record as the reference, within each pixel. As shown in figure 3, the digital records of a pixel are not in the same position as one another, therefore, their displacement is a shift due to misregistration and the filtering for compensation is provided for the color records, including red and blue.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. in view of Herman et al.

12. For claims 3 and 16, Yamamoto et al. disclose a method of dot sequential error correction, correcting the color misregistration of the multicolor linear image sensor as shown in figure 3. Yamamoto et al. teach color registration correction, which is the correction of the error between color spacing differences in each pixel (approximately 1/3 of each pixel), since each

Art Unit: 2612

color within the pixel is not in the same position, through the use of a digital filter in which the coefficients for amplitude and phase compensation are predetermined in the exemplary embodiment (figure 1) or through the feature/shift detection of each dot in the present embodiment (figure 8). Yamamoto et al. disclose, detecting a graphical element in each of the digital records. However, Yamamoto et al. do not disclose computing a centroid of the graphical element. Herman et al. also disclose an image registration system. However, Herman et al. teach of the image registration/alignment of frames of color mosaics. As stated in column 22 (lines 31 – 65) and as shown in figures 7 and 15, to align the mosaic images with one another Herman et al. computes a centroid for a graphical element in each image. As stated in column 22 (lines 58 – 60), at the time the invention was made, one with ordinary skill in the art would have been motivated to compute the centroid of a graphical element in an image as taught by Herman et al. in the color registration system with graphical element detection of Yamamoto et al. as means to minimize distortion of the images to be aligned at the edges after alignment. Therefore, it would have been obvious to one with ordinary skill in the art to have computed the centroid of a graphical element in an image as taught by Herman et al. in the color registration system with graphical element detection of Yamamoto et al.

13. Claims 10, 11, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al.

14. For claims 10 and 23, Yamamoto et al. disclose processing at least one of the digital color records with a digital filter having a phase response that compensates for the shift and a magnitude response that compensates for an aspect of the digital recorded other than misregistration. Yamamoto et al. do not disclose wherein the digital filter is obtained by

Art Unit: 2612

convolving a first digital filter having a phase response that compensates for the shift with a second digital filter having a magnitude response that compensates for an aspect of the digital records other than shift. Although, Yamamoto et al. disclose a single digital filter having both a magnitude and phase response responsible for compensating for resolution and shift, respectively, one with ordinary skill in the art would have been motivated to include two digital filters, convolving the first, which compensates for shift, with the second, which compensates for resolution as a means to provide two separate filters in which when applied with the same correction coefficients can focus explicitly on correcting shift and resolution, independently and respectively. Therefore, at the time the invention was made, it would have been obvious to one with ordinary skill in the art to have included two digital filters, convolving the first, which compensates for shift, with the second, which compensates for resolution.

15. As for claim 11, Yamamoto et al. do not disclose, as stated above, two digital filters, however it would have been obvious to do so. Yamamoto et al. disclose a digital filter, which compensates for resolution and shift (see column 5, lines 61 – 68). Therefore, Yamamoto et al. disclose wherein the second digital filter enhances the sharpness (resolution) of one or more of the digital records.

Allowable Subject Matter

16. Claims 5 and 18 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2612

17. For claims 5 and 18, the prior art does not teach or fairly suggest detecting similar features in wavelength-dependent digital records using elements of the spatial frequency response method for a slanted edge feature according to the ISO 12233 standard.

Art Unit: 2612

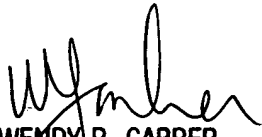
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin P Misleh whose telephone number is 703.305.8090. The examiner can normally be reached on Monday - Friday, 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy R Garber can be reached on 703.305.4929. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9314 for regular communications and 703.872.9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is 703.306.0377.

JPM

June 27, 2003


WENDY R. GARBER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600